Independent Peer Review

Stock assessment for yelloweye and yellowtail rockfishes

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Assignment undertaken for:
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August 2017

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Executive Summary

The panel review meeting for the benchmark stock assessments of yelloweye and yellowtail rockfish took place in Seattle between July 10th and July 14th, 2017. The focus of the review was the stock assessment work done for the two stocks of yellowtail and two area-specific components of a single yelloweye stock.

Both species were assessed using the length- and age-structured modelling software called Stock Synthesis (SS) which has been extensively used for stock assessments in the West coast of the US. The assessments made use of a diverse set of data sources to capture the best scientific knowledge for the two species, including fishery dependent and fishery independent abundance indices and length and age composition series. There was also further discussion at the review meeting about the best parametrisation of the models that led to the STAT adjusting their models.

A number of changes were made to the original models, especially for yellowtail, to correct errors, modify assumptions about some of the processes (e.g. selectivity patterns), and update the type of input data used (e.g. exclusion of some CPUE series). The final proposed models represented the version of the model in which the STAT had more confidence. However, for one of the stocks assessed, the southern yellowtail stock, the STAT was not able to construct a model that will provide realistic assessment results. For that reason, a stock assessment analysis for that stock was not put forward.

For the northern yellowtail stock, the model estimated current stock size at more than 70% of its unexploited population, which is the result of a continuous increase in the population starting just before 2000 and until 2016 that doubled the population size. For yelloweye, the model results indicated that the population remains below 40% of its pre-exploited size but it is increasing.

The final assessments proposed for the two stocks (northern yellowtail and yelloweye) represent the best scientific information available for those stocks and provide robust results that can support management.

Background

The 2017 Benchmark stock assessments for yelloweye and yellowtail rockfishes focused on the stocks of the two species that are found along the west coast of the United States from California to Washington.

Yelloweye rockfish is a long lived, slow growing, and low productivity species with a maximum age of about 140 years and a 50% maturity at about 22 years. It is found on the West coast of the US from Western Gulf of Alaska to northern Baja California. Yellowtail, on the other hand, is one of the faster growing rockfish species and can reach its maximum length (approximately 55 cm) in about 15 years with a length at 50% maturity of about 40 cm. Past studies indicate that yellowtail could live for more than 60 years but the data available for this assessment did not include any fish as old as that.

Yelloweye was declared overfished in 2002 and there have been very little catches of that species since then. The last full stock assessment of the yelloweye population was done in 2009 with an update in 2011. For yellowtail, the latest northern stock assessment took place in 2013, a data-moderate assessment, and in 2005 before that. A full stock assessment of the southern stock did not take place until 2013 and that probably reflects the different management regimes. The northern yellowtail stock is managed at stock-specific level while the southern stock is managed as part of the southern shelf rockfish complex. The last assessment for the southern yellowtail stock was considered to be a data-moderate one but was not reviewed.

Both species were assessed using the length- and age-structured modelling software called Stock Synthesis (SS). The software has been extensively used for stock assessments in the West coast of the US and elsewhere, and aims to provide a framework for combining information from different types of data to inform the model results about the status of the stock and impact of fishing pressure. The software includes two components: a population dynamics sub-model that simulates the age and length-specific structure of the population, and an observation sub-model which can make use of a wide range of data to calibrate the model. The observations that can be used in SS include: fishery CPUE or effort; survey abundance; discards; length-, age- and weight-composition data; and tag-recapture data (Methot and Wetzel, 2013).

A number of fisheries specific and non-fisheries data series were employed in the assessments and the models simulated fishing pressure associated with both commercial and recreational fisheries. For yelloweye, commercial landings were split into two categories; one coming from vessels using trawl gear, including small amounts of by-catch in the at-sea Pacific hake fishery, and one from vessels using fixed gear such as longline, troll, and hook and line. The model for northern yellowtail simulated commercial, by-catch, and recreational removals separately while only two fleet categories were used for the southern yellowtail stock; commercial and recreational.

Reconstruction of catch data also took place prior to the stock assessments and that produced a long catch series covering more than 100 years for both species. Fishery-dependent and fishery-independent CPUE series were also available for yellowtail covering the most recent time period (starting in the 80s) while for yelloweye, only fishery-dependent CPUE series were available starting in the 80s. The assessments also utilised length and age composition data that were available for both species.

The assessments made use of available data on growth, maturation, and fecundity to produce equations to simulate those processes. However, information about some

elements of the species biology such as natural mortality and level of recruitment mixing for yelloweye was limited and that contributed to the uncertainty characterising the model results.

The assessment calculated reference points based on SB40%, SPR 50%, and MSY that reflected targets used for the management of these fisheries. The assessment also did sensitivity analysis to test the effects of uncertainty on model results as important parameters could not be estimated and had to be fixed. Retrospective analyses and projections under different combinations of values of selected model parameters and for different future catch quotas were also run.

A number of changes were made to the original models, especially for yellowtail, to correct errors, modify assumptions about some of the processes (e.g. selectivity patterns), and update the type of input data used (e.g. exclusion of some CPUE series). The final proposed models represented the version of the model in which the STAT had more confidence. However, for one of the stocks assessed, the southern yellowtail stock, the STAT was not able to construct a model that would provide realistic assessment results. For that reason, a stock assessment analysis for that stock was not put forward. This stock will benefit from more work both to collect/analyse data and adopt an appropriate assessment framework.

For the Northern yellowtail stock, the model estimated current stock size at more than 70% of its unexploited population, which is the result of a continuous increase in the population starting just before 2000 and until 2016 that doubled the population size. The model predicts a slight decline in the population size in the past year.

For yelloweye, the model results indicated that population remains below 40% of its pre-exploited size but it is increasing. The assessment also highlighted that there was limited information to inform stock status and trends in the recent years as catches are very small and there is limited collection of fishery-independent data.

Two CIE reviewers were commissioned to participate in the stock assessment review panel and conduct an impartial and independent peer review of the stock assessments of the two species and in accordance with the SoW and ToRs herein. One of the reviewers also acted as the “consistent” CIE reviewer and participated in all STAR panels held in 2017. Each CIE reviewer is also required to produce an independent peer review report following the format and content of which is described in Annex 1. The report should be addressing each ToR as described in Annex 2.

I was the consistent reviewer and this document provides my review of the 2017 benchmark stock assessments of yellowtail and yelloweye stocks. Further details on the reviewer’s role and the review request of the Center for Independent Experts are presented below and in Appendix 2.

Description of the Reviewer’s Role in the Review Activities

I was contracted to:

1) Conduct necessary pre-review preparations, including the review of background material and reports provided in advance of the peer review.
2) Participate during the STAR Panel 2 review meeting as scheduled in Seattle, Washington during the dates of July 10th - 14th, 2017 as specified herein, and conduct an independent peer review in accordance with the ToRs (Annex 2).

3) No later than July 28, 2017, submit the draft independent peer review report to the contractor. The CIE review report shall be written using the format and content requirements specified in Annex 1, and address each ToR in Annex 2 (Appendix 2).

In addition to that, in my role as an active and engaged participant, I voiced concerns, suggestions, and improvements throughout the panel discussions while respectfully interacting with other review panel members, advisors, and stock assessment technical teams.

Summary of Findings

TOR 1. Become familiar with the draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g. previous assessments and STAR panel report when available) prior to review panel meeting.

Several documents were provided to us about two weeks before the meeting for both species including:

- The draft stock assessment reports;
- The Pacific Fishery Management Council's Scientific and Statistical Committee's Terms of Reference for Stock Assessments and STAR Panel Reviews;
- Stock Synthesis (SS) Documentation; and
- Past STAR Panels reports.

Other bibliography that became available to us either before or during the meeting is listed in Appendix 1.

I reviewed the assessment reports prior to the STAR Panel meeting and became familiar with other documents provided including the analytical model (Stock Synthesis) and the data that were used to populate the model. That process highlighted a number of questions which formed part of my contribution to the meeting.

TOR 2. Discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting.

Yellowtail

The assessment of yellowtail rockfish assumed that there were two stocks; one that occupies waters to the North of Cape Mendocino, California and off Washington and Oregon (northern stock), and the second covering waters off California, South of Cape Mendocino (Southern stock). It was assumed that the two stocks are completely separate (i.e. no mixing of the stocks).

Catch and CPUEs

The data used for the 2017 assessment included catches from commercial fisheries grouped in a single fleet partly due to lack of gear-specific details and recreational catches for both the Northern and Southern stocks. Catch reconstruction led to

expansion of some of the catch series to before 1900. Length composition data were available from both recreational and commercial fisheries and age-composition from commercial sources was available for the northern stock only.

Data on discards came mainly from an observer program that covered years since 2002, except for three years during an earlier period (1985-1987) for which a separate study produced discard estimates. The data available provide length compositions and discard ratios.

The CPUE indices that supported the original stock assessments were as follows:

Northern stock:

- PacFIN Trawl Logbook index, this also provided age and length composition data.
- Hake bycatch series, this dataset also provided length and age-composition data. Although data are available until 2016, the CPUE series stops in 1999. This is because there were changes in regulations after that.
- NWFSC Combo Survey which covers both the shelf and slope and also provided length and age composition data.
- AFSC Triennial Trawl Survey Index, this also provided length and age composition information. Although, it is not clear whether the survey method used to do the survey in 2004 was the same as the previous years, the survey was kept as a single index for this species.

Southern stock:

- MRFSS Index that reflects data collected from dockside surveys of the recreational fishery and also provided length composition information.
- CA Onboard Recreational Index which also provided length composition data.
- Juvenile pelagic index that focuses on the young-of-the-year class and also provided length and age composition data.
- NWFSC Hook and Line Survey Index, which also produced length composition data for a few years and age composition for one year.

The PacFin trawl logbook index was standardized using GLMM after Stephens-MacCall approach had been applied to filter the data to the set of fishing trips likely to have encountered yellowtail. The NWFSC Combo, hake by-catch, and AFSC triennial used a geospatial delta GLMM package called VAST, and which has been used by the STAT in the past and, as I understand, has also been presented at the SSC. The methodology has also been published (Thorson et al. 2015) and it appeared to be the preferred standardisation tool for the Northwest fisheries science center. The MRFSS index was standardised using GLM after Stephens-MacCall approach had been applied to filter the data to the set of fishing trips likely to have encountered yellowtail. GLM was also used for the NWFSC Hook and Line Survey Index.

The level of detail in the species used to associate other species with occurrence of yellowtail in the PacFin dataset varies depending on the state, and that means that the quality and accuracy of the analyses was not the same across states. Also, the PacFin index was originally constructed in fish/tow, and that was of concern as it was a crude effort unit to use. This was pointed out during the meeting and the CPUE was reanalysed to include hours fishing instead of number of tows. However, both the hake

and PacFin series were dropped as, after some scrutiny, the STAT felt that they did not have confidence in those data.

The NWFSC Combo Survey was also standardized for the whole area off the West Coast as, originally, it was chosen as one of the CPUE series to be included in the southern and northern models. Closer examination during the review meeting highlighted the imbalance between the samples taken from the area occupied by the Northern stock and that occupied by the Southern stock with many more samples taken in the former.

Further analyses during the review also indicated that the CPUE index of this survey changes depending on the standardization model used. There was not enough time during the meeting to consider this aspect of the model in much detail, but this needs to be revisited to fully understand the effects of the standardization model as this is another source of uncertainty.

The CA Onboard Recreational Index was also modified to account for changes in selectivity and the results showed that a two time-block approach gave a better fit. This dataset covers some of the areas in which the NWFSC Hook and Line Survey takes place and therefore, further analyses could compare data from this survey to those found with the hook and line survey in the same area to check whether there is alignment in the trend they predict. This is also important because information communicated during the meeting highlighted that the area from which the hook and line data were collected is considered to be at the boundary of the stock distribution. Therefore, it might not be representative of changes in the entire stock. So, further consideration in the value of these data will be useful.

It should be noted that fishery-independent CPUE indices for the Southern stock were available for the period 2000 onwards only, before that a limited amount of data come from fishery-dependent sources. In comparison, fishery-independent CPUE data are available starting from the 1980s for the Northern stock.

There were seven data series that provided length information and five that provided age data for the Northern stock. Those numbers were reduced to five and two respectively for the Southern stock with age composition data available for only three years highlighting the need for further data collection to cover the gaps.

Biological information

Same weight at length relationship was used for both sexes as it was not possible to find differences for either area. Natural mortality was calculated based on the Hamel prior and the 99 percentile of the age distribution of the age data used in this analyses. The latter corresponded to 35 and 45 years for the Northern stock and 30 and 40 years for the Southern stock for females and males respectively. Lognormal priors were constructed based with median values of M from the Hamel formula using those ages are 0.15 and 0.12 y^{-1} in the North and 0.18 and 0.135 y^{-1} in the South. However, other studies have indicated that the life span of yellowtail might be more than 60 years. Therefore, there is considerable uncertainty in the values of natural mortality. Also, it is not clear why there is such noticeable difference between the values of M for males and females. A beta distribution with parameters (μ=0.718 and σ=0.158) based on Thorson-Dorn rockfish prior (Thorson et al. 2017), was also developed for the calculations but eventually, the value was fixed at 0.718 for both stocks.

Maturity was also estimated using samples collected in 2016 and the same functions were used for both stocks as there was not enough data to estimate differences between the two areas. The length at 50% maturity was estimated at 42.5 cm. The new maturity curve was produced using 2016 data, but other studies suggests earlier maturity, so it is important to justify why choosing this new dataset to base the maturity curve was the best choice instead of actually using all the data that might be available over the years.

Yelloweye

Catch and CPUE series
Catch series from three fisheries representing trawl, non-trawl, and recreational fisheries for each of the two areas (North, South) were available. In the North, recreational catches were also split into Oregon and Washington. Commercial and recreational catches were reconstructed going back to 1889 for the non-trawl fishery in the North and back to early 1900's for California recreational and commercial fisheries. However, reconstruction of catches prior to 1981 had to rely on data on market categories to allocate unspecified catches of rockfish to yelloweye as data specific information was not available. That is a less refined approach and adds uncertainty in the catch data. The assessment also used information on bycatch in the foreign POP fishery and catches taken in the at-sea pacific hake fishery.

Historic discard studies confirm that there were no discards of yelloweye, so there were no discards included in removals for most of the time series. However, from 2002 onwards, introduction of new management measures has led to discarding of yelloweye and that is captured using discard information from the West Coast Groundfish Observer programme (WCGOP). For that period, discard estimates were added to recorded landings and included in the model as part of total removals. Length compositions of discards and landings for the same period were combined and used to inform selectivity curves.

At the beginning of the review meeting, the proposed model included the following information to provide signals about the stock structure and depletion:

- Triennial shelf survey that provided a relative abundance index and length composition.
- A slope-shelf survey (NWFSC shelf-slope survey) which provided a CPUE series for recent years as well as length and age-at-length composition data.
- A longline survey (IPHC) that targets halibut but also catches yelloweye, and provided a CPUE index as well as length and age-at-length compositions. This series included data from eight additional survey stations which were set to cover an area where yelloweye is encountered.
- CPUE series and length and age-at-length composition series from commercial fisheries and recreational fisheries from both the southern and northern area.

The two fishery-independent CPUEs were standardised using a spatio-temporal delta-model that was implemented in an R package called VAST. A delta-GLM approach was used to standardise the IPHC series. A two-step delta-GLM model was used to standardise the CPUEs coming from commercial fisheries after customized filtering was applied to each of them.

Biological information

Otoliths were used to calculate age and the maximum age in the samples used was 137 years. Some analyses of ageing error were also done but only to check intralab errors, as interlab comparison was ongoing. A function was developed to describe the error structure for each lab and that information was used to parametrise the base case model and for sensitivity analyses.

The maximum age was used to calculate natural mortality using the Hamel method and an age of 123 years. Growth is assumed to be the same for males and females and fecundity follows an exponential relationship with length. The parameters of that function are not available for yelloweye and those found for the rockfish complex based on meta-analyses (Dick et al. 2017) were used instead.

TOR 3. Evaluate model assumptions, estimates, and major sources of uncertainty.

Both assessments used the length- and age-structured modelling software Stock Synthesis (SS). For yelloweye, it was assumed that the population found in the west coast of the US is made up of two parts of the same stock that are linked via a common stock-recruitment relationship. For yellowtail, the assumption was that there were two separate stocks with no mixing with the separation line at Cape Mendocino, California. The latter is based on the results of genetic analyses that have identified differences between the two stocks.

The models used a diverse set of data covering landings and discards, CPUEs, length- and age-composition data, and length specific maturity and fecundity. They also used the Beverton-Holt stock-recruitment relationship to link spawning potential to recruits and selectivity functions including time blocking to characterise the behaviour of the fisheries over the years.

The assumption used about all three stocks is that there is no mixing either with the Canadian stock in the North or the Mexican stocks in the South. That is a strong assumption and there is information suggesting otherwise. For example, the results of the NWFSC Combo Survey show high occurrence of yellowtail fish near the Canadian borders suggesting that the Northern stock extends beyond the Washington borders. As far as there is effective management of the stocks on the other side of the border, this assumption might have little impact. However, it is recommended that catches of these species are monitored outside the study area considered here, so any high increases or change in catch patterns can be identified. Also, further work to better define the level of mixing (including egg/recruits distribution) will help reduce the uncertainty from this assumption.

Although the Southern model was not taken forward, some discussion about selectivity patterns took place that highlighted that the assumptions used about selectivity patterns do not adequately capture the changes in management. This is not of significance for this assessment, but needs to be addressed for the next stock assessment.

Yellowtail

The models for both yellowtail stocks (northern, southern) simulated a sex-disaggregated population dynamics starting from more than 100 years back and assuming that the stocks before were at unexploited conditions. The model assumed no uncertainty in the catches and used selectivity curves and time-blocking to simulate

the dynamics of the fleet. However, the original model did not account for depth restrictions that took place in the recent years and have made vessels targeting the northern stock moving closer to shore and the Panel recommended changes to address that.

Although separate priors were constructed for natural mortality for the two stocks, the analyses had to fix the M values for the Southern stock to those estimated for the Northern stock as the Southern model will not converge otherwise. Steepness was also fixed for both stocks. Other parameters that were treated as fixed included fecundity and maturity at length.

The model assumed 100% mortality for both commercial and recreational discards but there is very little information on which to base this assumption. During the meeting, it was noted that there were some data on recreational discard mortality which were not used for this assessment. It will be good to analyse them so they can be used for the next assessment.

For the southern stock, the only information about a length-age relationship comes from the commercial fishery. Age data from that series are used as conditional in the model to calculate the growth parameters, making it difficult to reduce their role/influence in the model. Further data analysis/collection to develop a growth equation for the Southern stock will be advisable to make the model less dependent on commercial data, and potentially reduce uncertainty.

The choice of using the SS to assess a stock such as the Southern yellowtail was not obvious, and despite the effort of the STAT, the model could not produce realistic results. That meant that a model for the Southern stock was not recommended. It would have been useful if some exploration had taken place prior to the review meeting to consider other modelling frameworks. However, as that assessment has been dropped, this is an issue to address for the next assessment.

Yelloweye

The model assumes that there is only one stock, but with two distinct components connected via a recruitment function. This structure reflects the fact that there are two distinct fisheries, one on the South and one on the North, but there are no strong evidence suggesting that the two parts of the stock are genetically different. Some indications were given by the study of Gao et al. (2010) but that was not conclusive. Therefore, this is a source of uncertainty and further genetic or other analyses of stock structure along the entire distribution of yelloweye could help reduce it.

The model starts in 1889 and assumes that the stock is at unfished equilibrium before that. Catches are assumed to be known without uncertainty and selectivity curves are used to describe the exploitation pattern of each fleet. On the latter, the model does not have much information to calculate the shape of the selectivity curves and therefore, the team had to fix some of them (assumed asymptotic selectivity).

The model simulated area-specific fishery dynamics for two areas as opposed to three distinct areas used in the previous assessment (Oregon and Washington were separate). That is reasonable given difficulties in separating the catches from those two areas. The model also simulates the population as a single gender as there were not sex-specific processes identified for this species.

The model used fixed values for natural mortality and steepness as initial runs indicated that there was not enough information in the data to estimate them. The value of M was set equal to 0.0439, which is the value found using the Hamel (2015) method, and an age of 123, which is the 90% of the maximum age. This is a source of uncertainty and the STAT sought to reduce it by considering the M values that different calculation methodologies would give and constructed a prior by combining the results. That was used for sensitivity analyses. The value for steepness was fixed at 0.718 following the same logic as that for yellowtail (mean of the prior based on steepness of 10 assessed rockfish).

Although recruitment is allowed to deviate from the Beverton-Holt recruitment function, the proportion of recruitment allocated to each segment of the stock was fixed, and did not depend on the size of spawning biomass in that segment of the stock. Other parameters that were fixed in the model are weight at length, and maturity and fecundity at length.

The STAT used the standard MLE approach to find the optimum fit of the model to the data, but also repeated the analyses using Bayesian estimation although the latter was for illustration only. The analyses also followed a well-structured process for testing the model sensitivity to the input data, as a well as model specifications. The former involved removing input data one set at a time and presenting the change in key outputs of the model, while the latter used different assumptions/values about fixed processes and presented the change in model outputs.

The single-stock assumption is acceptable, but might not be very practical in terms of highlighting localised pressure and could actually have the opposite effect. The assumption of uniform redistribution of recruitment might also mean that localised depletion issues are missed. On the latter, the proportion of recruitment that is allocated to each segment of the stock is fixed over the years, and the analysis showed that the southern stock receives more recruits even when its size is reduced considerably. This also adds to the uncertainty, and therefore, better description of the process that determines how the recruitment is distributed to the two areas will be very useful.

There are very little data on population trends for the recent period, and one of the results of that is the lack of a commercial CPUE (trawl or non-trawl CPUE). The STAT explained that the difficulties stem partly from the fact that this stock was recorded as a complex until 2003. Also, there were very little catches in the past few years, so creating a CPUE for the period after 2003 is also of little use.

This highlights an important challenge for the assessment of yelloweye; that it is not clear what data will inform the assessment in 3-5 years. Therefore, prompt response and consideration of data collection options is required to identify/collect data that could inform the next assessment.

TOR 4. Provide constructive suggestions for current improvements if technical deficiencies or major sources of uncertainty are identified.

The issues identified above were explored during the review meeting and suggestions for improvements or testing of alternative options were recommended for both species. So, in terms of immediate improvements, those would be for the STAT to capture the changes identified during the meeting. Some key points are also listed below.

Given concerns raised about the limited time the STAT had to incorporate some of the data into the model, especially in relation to yelllowtail, it will be recommended that a more thorough consideration of the data series is done in collaboration with the people who provided the data to ensure that they are used correctly, and the STAT understands their strengths and weaknesses. The assessment report also needed to include more detail about the data used, their analyses, and overall model parametrization. The updated report needs to describe those elements of the assessment in more detail highlighting issues and strengths.

Also, for yellowtail, given considerable uncertainty about its natural mortality, it is recommended that alternative approaches are considered including using different mortality for different ages, as done in the 2005 assessment for length specific mortality.

On presentation of results, the residual patterns that come from the VAST analyses seem to show only the extreme residuals misfit. It will be useful if the graph could show more residuals, not just where the extreme ones occurred. I will also recommend that CPUE series that were considered but not used in the end to be covered in the assessment report with an explanation of why they were not used, how they were developed, and what else might need to be done for them to be of value.

After the review meeting, the Panel was informed of possible model misspecifications when the SS runs in forecasting mode; that relates to the selectivity pattern that is used to do the projections which might not be the right one if blocking is being used. Therefore, these assessments should check for such misspecifications.

On yelloweye, during the meeting, it was clarified that recreational catches accounted for mortality by depth in Oregon and California to reflect the fact that yelloweye can survive if they are released carefully back to sea. Information about this aspect of the calculations need to be added to the report.

TOR 5. Determine whether the science reviewed is considered to be the best scientific information available.

Both teams looked to incorporate knowledge from several sources to inform the models and used a highly sophisticated model for their stock assessment.

On the data side, the input to the model represented the current state of knowledge about those species, and therefore it represents the best information available. However, the way these data were handled suggest that better understanding of the data could have increased their contribution even more; that was more pronounced in the case of the yellowtail assessment. Further scrutiny during the review meeting helped address that issue to some extent, but more work will be needed to maximize the value of the data for the next assessment.

Overall, the assessments for the other two stocks (Northern yellowtail and yelloweye) represent the best information currently available and can support management.

TOR 6. When possible, provide specific suggestions for future improvements in any relevant aspects of data collection and treatment, modeling approaches

and technical issues, differentiating between the short-term and longer-term time frame.

This section starts with a recommendation that applies to both species and then provides species-specific suggestions.

On general issues, the most important thing to highlight is that the STAT seemed to have spent a lot of time learning the SS package and trying different parametrisations and features, but that did not seem to be the case for the input data (e.g. surveys data). That was also reflected in the decision of the STAT to change the series they used in the final model from those that had been put forward in the original assessment reports and the corrections in the input data that had to be done during the review meeting. I strongly recommend that more time be spent by the STAT and other people who provide these data to understand/analyse the data and document their contribution to the assessment of the specific species and how relevant/representative they are for that species. This is in addition to a more general comment I have made under ToR 7 about documentation.

Yellowtail

Short-term

During the meeting, it was noted that there are otoliths collected in the past that have not been aged. It is recommended that those are aged and are used together with more recent data to do a comparison of age differences between the southern and northern stock.

Although the PacFin CPUE index was removed from the calculations, it still provides a source of data, and therefore it is important that it is properly analysed, including filtering and understanding the origin and reporting procedures of the data to decide whether a representative index could be created from this dataset.

Similarly, during the review meeting it was indicated that there was additional data on hake bycatch, and observers were still recording data, so maybe a longer CPUE (or two segments) could be created. It is recognised that changes have happened in this fishery and it is also not clear to what extent it provides a representative picture of yellowtail abundance. However, it is worth considering further the merits of these dataset even if it is simply to robustly reject these data. At present, there is not a strong argument either way.

The Washington recreational fishery seems to be catching a lot of big fish, but they are not aged. Those otoliths could provide information about Amax, which is an important source of uncertainty for the assessment, so it is suggested that some age sampling of this fishery be done.

During the meeting, we heard that an index of abundance for juvenile species for the Northern stock of yellowtail has been developed, so it is recommended that these data are also examined to see if they can be included in the next stock assessment to provide more information about recruitment strengths

Longer-term

For both stocks, there are limited data to support development of a fishery-independent CPUE series, together with length and age composition. Therefore, priority should be given to work for identifying the data/series type that will be the best to collect and adjust existing data collection (if possible, or extend data collection) to collect them.

On the southern stock, the main priority is to revisit the Southern model and undertake additional analyses of input data, decide on the type of model that is appropriate for the data available, and consider possible parametrisations, so a stock assessment for the Southern stock can be done.

As part of this process, further review and analyses of the indices and other input series is recommended to understand the signals they provide and their merits. For example, work to compare data from the CPFV recreational survey to those found with the hook and line survey in the same area will help identify whether there is conflict in the predicted trends.

Yelloweye

Short-term

There is imbalance between North and South with more data coming from the North. The use of single model partly confounds that as it combines the data, so the smaller amount of data from the South is less pronounced. Notwithstanding that, the assessment provided an insight into data gaps, especially for recent years which is partly due to limited exploitation but also limited fishery-independent data collection. Therefore, collection and analyses of data such as age and length composition and fishery-independent relative abundance is recommended as a priority.

Aging of data seems to present challenges with differences in aging reading produced by different labs. So, there is a need to account for that uncertainty as it will also affect the values of natural mortality. Therefore, further work on validation to improve the aging process is recommended.

Given the distribution of the species that extend beyond the US borders, it is important that exploitation and status of the stocks in the Canadian and Mexican water are monitored.

Longer-term

Sensitivity analyses showed that the model was very sensitive to the choice of recruitment ratio for North-South distribution of recruitment. Therefore, additional studies to ascertain the level of mixing and degree of connectivity of the two stocks will help produce a more robust model.

Linked the previous point, it is also recommended that a genetic or other appropriate analysis be done to test whether the Southern and Northern population are part of a single stock.

TOR 7. Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

Yellowtail

A lot of the discussion during the review focused on the input data and specifically the CPUE and composition series that were used for the analyses. This was because there wasn't clarity about each of those datasets both in terms of the raw data but also their analyses. As such, there were concerns that the merits of each data series were not understood. Other general issues included aging error for which comparisons within labs and between labs were reviewed.

For the Northern stock, requests involved providing further details about the PacFin CPUE, and also additional analyses to express it in different units as the original one was not considered the best option. During this process, STAT's confidence in this dataset declined. Similarly, they reconsidered the index developed using the hake fishery and they also felt that it brought little value. The argument was that fishery-dependent CPUEs were adopted many years ago when information from other resources were limited. Given access to new datasets now, those original indices are less important. Therefore, the STAT proposed that both indices be dropped and there were no objections to that.

There were also concerns about the length composition pattern from the WA recreational (sports) time series; the STAT revisited the data and confirmed that there were inconsistencies in the units used (cm vs mm), and also found an error in the data allocated to each year. Therefore, both age and length data from that series were reanalyzed. New assumptions about selectivity were also explored leading to updated selectivity curves for the Northern stock. The new basecase model developed through this process differed noticeably from the original one, as it had a smaller number of CPUEs and updated length, age compositions and selectivity curves for some of the fleets. The final stage of the discussion focused on identifying the parameters and their range to use to characterize uncertainty in decision tables.

On the Southern stock, revision of CPUE indices was also undertaken to address concerns about selectivity patterns and fisheries behavior. As mentioned already, the Southern model could not estimate natural mortality, so the approach was to set the values of M equal to those estimated with the Northern model. However, the model results showed patterns that the STAT did not believe were realistic. Therefore, they confirmed that they will not put an assessment model forward for consideration for this stock. For this reason, no further analyses were requested for the Southern stock.

However, the consensus was that there was potential in continuing developing the model, and revisit it when additional data become available. On the latter, it was clear that the existing data was not informative enough to support a plausible model and further collection of data or analyses of existing material is strongly recommended. This covers age and length compositions as well as data to develop growth equations.

Minor issues/editorial

- The tables and figures that present the input data do not match, see for example the table on page 37 and figure 69.

- Also, the tables on page 35 and 36 suggest that more fish were aged than those that were measured, and that is unrealistic. The STAT confirmed that the figures will be cross referenced again and corrected for the final report.

Yelloweye

At the beginning of the meeting, the STAT indicated that the model was updated to address some issues identified since the assessment report was sent. Those were:

- *Include a ramp-up on CA non-trawl catches from 1889 to 1916.*
- *Add newest maturity ogive.*
- *Include mid 1940s-1960s catches off OR landed in CA.*
- *Interpolate missing WA recreational catches.*

The STAT also reconsidered the inclusion of those recreational CPUE indices with poor diagnostics, but, in the end, they decided to keep them in the model. There was not an updated version of the report. Instead, STAT presented the new configuration and data during the first day of the review meeting. The results showed that these changes did not affect the model results that remained almost unchanged. The panel accepted these changes that became part of the base case model. The STAT had run a range of sensitivity runs and were well prepared to answer the questions of the Panel.

Additional requests aimed to develop a better picture of uncertainty associated with maximum age and hence with natural mortality. That included calculating the 99% of the age distribution, employing catch curve analyses to calculate M, and considering published values of maximum age for yelloweye. These requests showed that there is considerable variability in the values of M that would be considered plausible and the Panel found that useful as it could inform discussions about the design of the decision table.

The Panel also requested additional sensitivity analyses to test the impact of the assumption about the proportion of recruits that are allocated to each area (60:40 redistribution ratio for WA+OR: CA). Runs with different ratios showed that the model results were sensitive to the choice of this ratio. However, there is no external information to support one value of that ratio over the other, and likelihood profiles suggested that the model data support the current choice of that ratio. Therefore, no changes to the ratio were made.

However, the STAT produced a graph that showed the relative size of the spawning output in each area against the proportion of recruitment that each area received each year. The graph showed that the size of the spawning population in California declined to less than 10% in the 1990s, but the recruitment it received continued to be 40% of the total recruitment. That indicates that the California part of the stock might act as a sink, and during that period, it relied on constant/high recruitment from the Northern part of the stock to sustain the fishing pressure.

Another sensitivity run explored the impact of the WA recreational dockside index by running the model with only that series. This was because the trend of this index differed from that of the other indices. The model results did not change from those of the base case model, further highlighting the insignificant influence that the indices had on model outputs.

Building on these sensitivity runs, the final part of the review meeting focused on identifying the axes of uncertainty to build a decision table. Natural mortality was chosen to define the axis.

General recommendations

As I was the constant reviewer, some of my comments below apply to this assessment review, but also represent my overall impression of processes and issues across assessments reviewed.

Several surveys were presented and used for the stock assessments and have been collecting data for many years. Although a short description of each of them was included in the assessment reports, there is the need for a more in-depth description of those surveys, so their scope, spatial distribution, main characteristics and type of fish for which it is appropriate can be better understood. At present, the descriptions available are fragmented, and it is even more difficult to understand how those surveys perform individually, but also cumulatively with regards to species assessed. Furthermore, different names are used to describe the same dataset adding to the confusion. Therefore, it is recommended that a standalone document providing details about each survey be prepared, which could serve as the basis for any further, maybe species-specific, description of the surveys that is included in the assessment report.

As mentioned elsewhere, in a number of occasions, it was not clear whether the STAT fully understood the data that went into the model. Also, some input data were dropped from the analyses after scrutiny during the review meeting. A thorough data evaluation workshop is recommended to scrutinise and select the data to go to the assessment. This is important to ensure that problems with the data have been fleshed out before the stock assessment starts.

The assessment teams continued their analyses even after they had submitted the draft assessment to the STAR Panel. As such, by the time the Panel meeting took place, there were new results and modifications of the model. However, unlike the first STAR panel, one of the two stock assessment reports was updated just before the Panel meeting to include the new runs. Although I do not support the practice of sending a report out and then continuing doing work, I strongly recommend that if assessment teams are allowed to conduct further analyses and present new results on the first day of the meeting, then they should also produce a revised report.

Conclusions/Recommendations

The panel review meeting for the benchmark stock assessments of yelloweye and yellowtail rockfish took place in Seattle between July 10th and July 14th, 2017. The focus of the review was the stock assessment work done for the two stocks of yellowtail and two area-specific components of a single yelloweye stock.

Both species were assessed using a length- and age-structured modelling software called Stock Synthesis, which also allows for age and length composition data to be incorporated into the analyses.

A diverse set of data were used as input to the models covering fishery-dependent and fishery-independent sources. However, the input data were not informative enough to support estimation of key biological and other parameters, and that meant that a

number of assumptions had to be made to parametrise the model. However, even with those assumptions, it was not possible to get one of the models to produce realistic results (southern yellowtail).

The final assessments proposed for the other two stocks (northern yellowtail and yelloweye) represent the best scientific information available for those stocks and provide robust results that can support management.

The analyses predicted that, for the northern yellowtail stock, current stock size is at more than 70% of its unexploited population and that is the result of a continuous increase in the population starting just before 2000 and until 2016. For yelloweye, the model results indicated that population remains below 40% of its pre-exploited size, but it is increasing. The assessments also highlighted important gaps in the data that affect the robustness of the model results and provided an insight into priorities for future work.

A list of the recommendations made under each of the ToR above are summarised here starting with general ones and then listing species specific ones.

Recommendation 1 The NWFSC Combo Survey CPUE index is sensitive to the standardization model used. There was not enough time during the meeting to consider this aspect of the model in much detail, but this needs to be revisited to fully understand the effects of the standardization model.

Recommendation 2: The assumption used for all three stocks is that there is no mixing either with the Canadian stock in the North or the Mexican stocks in the South. it is recommended that catches of these species are monitored outside the study area considered here, so any high increases or change in catch patterns can be identified. Also, further work to better define the level of mixing (including egg/recruits distribution) will help reduce the uncertainty from this assumption.

Recommendation 3: I recommend that a more thorough consideration of the data series be done in collaboration with the people who provided the data. This is to scrutinise and select the data to go to the assessment and ensure that the STAT understands their strengths and weaknesses.

Recommendation 4: The assessment report also needs to include more detail about the data used, their analyses, and overall model parametrization. I will also recommend that CPUE series that were considered but not used in the end to also be covered in the assessment report with an explanation of why they were not used, how they were developed, and what else might need to be done for them to be of value.

Recommendation 5: It is recommended that a standalone document providing details about each survey should be prepared and that serves as the basis for any further, maybe species-specific, description of surveys included in the assessment report.

Recommendation 6: I strongly recommend that if assessment teams are allowed to conduct further analyses and present new results on the first day of the meeting, then they should also produce a revised report.

Recommendation 7: The residual patterns that come from the VAST analyses seem to show only the extreme residuals misfit. It will be useful if the graphs could show more residuals, not just where the extreme ones occurred.

Recommendation 8: Yellowtail: information communicated during the meeting highlighted that the area from which the NWFSC hook and line data were collected is considered to be at the boundary of the stock distribution. Some of the areas in which the NWFSC Hook and Line Survey takes place are also covered by the CA on-board recreational survey and therefore, further analyses could compare data from this survey to those found with the hook and line survey in the same area to check whether there is alignment in the trends they predict.

Recommendation 9: Yellowtail: There were only two data series that provided age composition data for the southern stock and that was for only three years. This highlights the need for further data collection to cover the gaps on both age and length composition data.

Recommendation 10: Yellowtail: it is not clear why there is such noticeable difference between the values of M for males and females, but this causes differences in the dynamics of each gender. As M is one of the most influential parameters in the model, this difference needs to be explored further to understand if it is real or an artefact of the gender-specific availability to surveys/fishery.

Recommendation 11: Yellowtail: The new maturity curve produced for yellowtail used 2016 data only. Other studies suggest earlier maturity than that supported by the new maturity curve. Therefore, further work is needed to justify why this new dataset is a better choice for calculating the maturity curve, or alternatively, consider whether it is better to use all the data available.

Recommendation 12: Yellowtail: Although the Southern model was not taken forward, some discussion about selectivity patterns took place that highlighted that the assumptions used about selectivity patterns do not adequately capture the changes in management. This needs to be addressed for the next stock assessment.

Recommendation 13: Yellowtail: The model assumed 100% mortality for both commercial and recreational discards, but there is very little information on which to base this assumption. During the meeting, it was noted that there were some data on recreational discard mortality which were not used for this assessment. It will be good if those could be analysed so they can be used in the next assessment.

Recommendation 14: Yellowtail: For the southern stock, the only information about the length-age relationship comes from the commercial fishery. Age data from that series are used as conditional in the model to calculate growth parameters, making it difficult to reduce their role/influence in the model. Further data analysis/collection to develop a growth equation for the southern stock will be advisable to make the model less dependent on commercial data.

Recommendation 15: Yellowtail: The choice of using SS to assess a stock such as the southern yellowtail was not obvious given the paucity of data available for this stock. It would have been useful if some exploration had taken place prior to the review meeting to consider other modelling frameworks. This is something to consider for the next assessment.

Recommendation 16: Yellowtail: Given considerable uncertainty about its natural mortality of yellowtail, it is recommended that alternative approaches are considered, including using different mortality for different ages as done in the 2005 assessment, or length specific mortality.

Recommendation 17: Yellowtail: It seems that there are otoliths collected in the past that have not been aged. It is recommended that those are aged and are used together with more recent data to do a comparison of age differences between the southern and northern stocks.

Recommendation 18: Yellowtail: Although the PacFin CPUE index was removed from the calculations, it still provides a source of data, and therefore, it is important that it is properly analysed including filtering and understanding the origin, and reporting procedures of the data to decide whether a representative index could be created from this dataset.

Recommendation 19: Yellowtail: During the review meeting it was indicated that there was additional data on hake bycatch and observers were still recording data, so maybe a longer CPUE (or two segments) could be created. It is worth considering further the merits of these dataset even if it is to just robustly reject these data. At present, there is not a strong argument either way.

Recommendation 20: Yellowtail: The Washington recreational fishery seems to be catching a lot of big fish but they are not aged. Those otoliths could provide information about Amax, which is an important source of uncertainty for the assessment, so it is suggested that some age sampling of this fishery be done.

Recommendation 21: Yellowtail: Information suggests that an index of abundance for juvenile species for the Northern stock of yellowtail has been developed, so it is recommended that these data be also examined to see if they can be included in the next stock assessment.

Recommendation 22: Yellowtail: For both stocks, there are limited data to support development of a fishery-independent CPUE series and associated length and age compositions. Therefore, priority should be given to work for identifying the data/series type that will be the best to collect and adjust existing data collection (if possible, or extend data collection) to collect them.

Recommendation 23: Yelloweye: The assessment highlighted that there was limited information to inform stock status and trends in the recent years as catches are very small and there is limited collection of fishery-independent data. This is an important challenge for the assessment of yelloweye, and if that continues, it is not clear what data will inform the assessment in 3-5 years. Therefore, prompt response and consideration of data collection options is required to identify/collect data that could inform the next assessment.

Recommendation 23: Yelloweye: It is not clear whether the two parts of the yelloweye stock are genetically different. Some indications were given by the study of Gao et al. (2010) but that was not conclusive. Therefore, this is a source of uncertainty and further genetic or other analyses of stock structure along the entire distribution of yelloweye could help reduce it.

Recommendation 24: Yelloweye: The proportion of recruitment that is allocated to each segment of the yelloweye stock is fixed over the years, and the analysis showed that the southern stock receives more recruits, even when its size is reduced considerably. Sensitivity analyses also showed that the model was very sensitive to the choice of recruitment ratio. Future work to better describe the process that determines how the recruitment is distributed and ascertain the level of mixing and degree of connectivity of the two stocks will be very useful.

Recommendation 25: Yelloweye: There is imbalance between North and South with more data coming from the North. There are also data gaps overall, especially for recent years, which is partly due to limited exploitation but also limited fishery-independent data collection. Therefore, collection and analyses of data, such as age and length composition and fishery-independent relative abundance, is recommended as a priority to fill the gaps and produce a more balanced set of data.

Recommendation 26: Yelloweye: Aging of data seems to present challenges with differences in aging reading produced by different labs. There is a need to account for that uncertainty as it will also affect the values of natural mortality. Therefore, further work on validation to improve the aging process is recommended.

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Draft Yelloweye Assessment, associated model files and supplementary Tables

Draft Yellowtail Assessment and associated model files

Appendix 2. Statement of Work for Dr Panagiota Apostolaki

External Independent Peer Review by the Center for Independent Experts

Stock Assessment Review (STAR) Panel 2

Background

The National Marine Fisheries Service (NMFS) is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NMFS science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for fishery conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards.
(http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf).
Further information on the CIE program may be obtained from www.ciereviews.org.

Project Description

The National Marine Fisheries Service and the Pacific Fishery Management Council will hold stock assessment review (STAR) panels in 2017 to evaluate and review benchmark assessments of Pacific coast groundfish stocks. The goals and objectives of the groundfish STAR process are to:

1) ensure that stock assessments represent the best available scientific information and facilitate the use of this information by the Council to adopt OFLs, ABCs, ACLs, (HGs), and ACTs;
2) meet the mandates of the Magnuson-Stevens Fisheries Conservation and Management Act (MSA) and other legal requirements;
3) follow a detailed calendar and fulfill explicit responsibilities for all participants to produce required reports and outcomes;
4) provide an independent external review of stock assessments;

5) increase understanding and acceptance of stock assessments and peer reviews by all members of the Council family;
6) identify research needed to improve assessments, reviews, and fishery management in the future; and
7) use assessment and review resources effectively and efficiently.

Benchmark stock assessments will be conducted and reviewed for yelloweye and yellowtail rockfishes. Yelloweye rockfish was assessed as a benchmark assessment in 2009 and fully updated in 2011. In 2015, a catch-only projection update was conducted to monitor this rebuilding stock and provide scientific-based advice for management. Yelloweye rockfish remains a highly constraining species for coastwide nearshore commercial and recreation fisheries, and this assessment will incorporate more recent information regarding rockfish productivity. Yelloweye rockfish has been managed under a rebuilding plan for over a decade and is not expected to be rebuilt for several more decades. However yelloweye rockfish was identified as a strong candidate for assessment during the Pacific coast groundfish regional stock assessment prioritization process, which was based on the national stock assessment prioritization framework (http://www.st.nmfs.noaa.gov/Assets/stock/documents/PrioritizingFishStockAssessments_FinalWeb.pdf.

Yellowtail rockfish was historically an important target species for mid-water and bottom-trawl fisheries. Opportunities to target yellowtail rockfish in those fisheries were greatly reduced when widow rockfish rebuilding began 15 years ago and continued early in the trawl rationalization program. Now that both widow rockfish and canary rockfish have completed rebuilding, a mid-water fishery targeting these species is expected to grow in the near future. The northern portion of the stock was last assessed as part of the data-moderate assessments in 2013, which showed the stock in the northern part of the coast to be increasing, and above the target biomass. However, the yellowtail rockfish assessment will have considerable new information relative to the last benchmark (2001) and data-moderate assessments. Benchmark assessments also involve more data types and complex modeling, and therefore, if supported by the available data, provide more complete and less uncertain estimate of the stock biomass and relative status.

Assessments for these two stocks will provide the basis for the management of the groundfish fisheries off the West Coast of the U.S. including providing scientific basis for setting OFLs and ABCs as mandated by the Magnuson-Stevens Act. The technical review will take place during a formal, public, multiple-day meeting of fishery stock assessment experts. Participation of external, independent reviewer is an essential part of the review process. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewers

NMFS requires two CIE reviewers to participate in the stock assessment review panel. One CIE reviewer shall conduct an impartial and independent peer review of the two assessments described above and in accordance with the SoW and ToRs herein. Additionally, a second "consistent" CIE reviewer will participate in all STAR panels held in 2017.

Both CIE reviewers shall be active and engaged participants throughout panel discussions and able to voice concerns, suggestions, and improvements while respectfully interacting with other review panel members, advisors, and stock assessment technical teams. The CIE reviewers shall have excellent communication skills in addition to working knowledge and recent experience in fish population dynamics, with experience in the integrated analysis modeling approach, using age-and size-structured models, use of Markov Chain Monte Carlo (MCMC) to develop confidence intervals, and use of Generalized Linear Models in stock assessment models.

Statement of Tasks

Each CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Pre-review Background Documents: At least two weeks before the peer review, the contractor will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Documents to be provided to the CIE reviewers prior to the STAR Panel meeting include:

- The current draft stock assessment reports;
- The Pacific Fishery Management Council's Scientific and Statistical Committee's Terms of Reference for Stock Assessments and STAR Panel Reviews;
- Stock Synthesis (SS) Documentation
- Additional supporting documents as available.
- An electronic copy of the data, the parameters, and the model used for the assessments (if requested by reviewer).

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein.

Contract Deliverables - Independent CIE Peer Review Reports: The CIE reviewer shall complete an independent peer review report in accordance with

the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in **Annex 1**. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in **Annex 2**.

Other Tasks – Contribution to Summary Report: The CIE reviewers may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. The CIE reviewers are not required to reach a consensus, and should provide a brief summary of each reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Timeline for CIE Reviewers

The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

4) Conduct necessary pre-review preparations, including the review of background material and reports provided in advance of the peer review.
5) Participate during the STAR Panel 2 review meeting **in Seattle, WA, during the dates of July 10-14, 2017,** as specified herein, and conduct an independent peer review in accordance with the ToRs (**Annex 2**).
6) No later than **July 28, 2017**, each CIE reviewer shall submit their draft independent peer review report to the contractor. Each CIE report shall be written using the format and content requirements specified in **Annex 1**, and address each ToR in **Annex 2**.

Foreign National Security Clearance

When reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for reviewers who are non-US citizens. For this reason, the reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/ and http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html. The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance

For the **STAR panel 2** review, the CIE reviewers shall conduct an independent peer review during the panel review meeting scheduled in **Seattle, Washington during the dates of July 10-14, 2017.**

Period of Performance

The period of performance shall be from the time the award through August 30, 2017. Each reviewer's duties shall not exceed 14 days to complete all required tasks.

Schedule of Milestones and Deliverables

The contractor shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

June 2, 2017	Contractor selects and confirms reviewers
June 26, 2017	Contractor provides pre-review documents to the reviewers
July 10-14, 2017	Each reviewer participates and conducts an independent peer review during the panel review meeting
July 28, 2017	Contractor receives draft reports
August 14, 2017	Contractor submits final reports to the Government

Applicable Performance Standards

The acceptance of the contract deliverables shall be based on three performance standards:
(1) The reports shall be completed in accordance with the required formatting and content in **Annex 1**; (2) The reports shall address each ToR as specified **Annex 2**; and (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Travel

All travel expenses shall be reimbursable in accordance with Federal Travel Regulations (http://www.gsa.gov/portal/content/104790). International travel is authorized for this contract. Travel is not to exceed $8,200.

Restricted or Limited Use of Data

The contractors may be required to sign and adhere to a non-disclosure agreement.

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Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review

Stock Assessment Review (STAR) Panel 2

1. Become familiar with the draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g. previous assessments and STAR panel report when available) prior to review panel meeting.
2. Discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting.
3. Evaluate model assumptions, estimates, and major sources of uncertainty.
4. Provide constructive suggestions for current improvements if technical deficiencies or major sources of uncertainty are identified.
5. Determine whether the science reviewed is considered to be the best scientific information available.
6. When possible, provide specific suggestions for future improvements in any relevant aspects of data collection and treatment, modeling approaches and technical issues, differentiating between the short-term and longer-term time frame.
7. Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

Annex 3: Tentative Agenda

TBD

Stock Assessment Review (STAR) Panel 2

Pacific ocean perch and Yellowtail rockfishes
Seattle, Washington

NWFSC
2725 Montlake Blvd, NE
Seattle, WA 98112
July 10-14, 2017

Appendix 3: Panel Membership
In alphabetical order

Panayiota Apostolaki, CIE reviewer
John Budrick, California Department of Fish and Wildlife
John Field, Southwest Fishery Science Center, (Chair)
Kevin Stokes, CIE reviewer